Carr Research Laboratory, Inc.
Environmental Science, Engineering, & Resource Management

(508) 651-7027
(781) 237-2486 (evenings)
(508) 647-4737 (Fax)

Administrative Office:
17 Waban Street
Wellesley, MA 02482-6310

Technical Office:
5 Wethersfield Road, Suite 5
Natick, MA 01760-0710

carr@carr-research-lab.com
www.carr-research-lab.com

1 August 2001

Rec'd

UPDATED WILDLIFE HABITAT ENHANCEMENT PLAN
LOT 1 NEWTOWN ROAD
ACTON, MA

1.0 Introduction

A Notice of Intent (NOI) for Lot 1 Newtown Road has been approved under a Superceding Order of Conditions (SOC) by the Department of Environmental Protection (DEP) and has been denied under the Acton Wetland Protection Bylaw (the "Bylaw") twice. The most recent denial took place on April 18, 2001. This report is to accompany the most recently revised NOI filing under the Bylaw currently before the Commission and to accompany the site plan labeled "Wildlife Habitat Enhancement Plan" dated June 27, 2001, revised July 31, 2001, by Foresite Engineering Associates, Inc.

The purpose of this report is to evaluate the site for wildlife habitat and to use mitigation and enhancement techniques to protect and demonstrate no ***significant*** impacts to the interests of the Bylaw, specifically as they pertain to wildlife habitat.

2.0 Existing Conditions

2.1 General Conditions

A site was inspected on June 8, 2001 and July 18, 2001 by the staff of Carr Research Laboratory, Inc. (CRL) to examine existing conditions. The triangular shaped lot contains three wetland areas. A large bordering vegetated wetland (BVW) which follows the southern property edge and which is associated with the "river" known as Conant Brook. Conant Brook has a 200 foot riparian zone. The second wetland is a smaller BVW which divides the uplands on-site and which is associated with an intermittent stream flowing generally west to east. Finally a small area of BVW is found along Newton Road which discharges through a 15 inch culvert under the road. Each of these BVW resource areas has a 100-foot buffer zone.

The site is not a pristine land. There is an old cart path cutting through the site. There also is an old foundation or old excavation on site. The excavation representing this past land use is on the southwest side of the hill closest to the road. Since there are signs of ornamental plantings dominating areas outside of this excavated area, it is more likely to be an old foundation. Specifically, there is an area dominated by periwinkle and violets in the herb layer, while wisteria is a dominant shrub and vine near the excavation.

In addition, along Newtown Road, there are several plant species which exist along the edge of the road but which are not common in the interior of the site. Some of these species are invading the interior of the site. The weedy species found along the edge of the road include the following with an asterisk indicating invasion of the upland interior of the site: Norway maple*, crab apple, grape*, flowering dogwood*, beggar-tick, bleeding heart, bushy aster(?)*, common plantain, smartweed*, bracken fern, bittersweet nightshade, common mullein, panic grass*, sweet goldenrod, pokeweed* and mugwort.

2.2 Conant Brook Wetland

Concerning the large expanse of wetlands associated with Conant Brook, the water elevation in this wetland has been recently increased, reportedly by a beaver dam. Thus the former forested swamp on both sides of Newtown Road has been drown and a major cattail invasion has occurred. The stand of dead trees in this wetland is strong evidence of this widespread wetland alteration due to backflooding the land.

2.3 The Small Wetland Near Newtown Road

The small wetland lying right along Newtown Road, (the "northern wetland,") covers and area of 6,440 square feet. This wetland has three components. The northwest portion of the wetland has a small temporary pooled area (component 1). The area is drained by an obvious channel (component 2) toward the culvert under Newtown Road. The pooled area and channel are both surrounded by bordering vegetated wetland (component 3). The project engineers surveyed the elevations in the center of the stream channel and have added some spot elevations inside the wetland. The plans have been amended to reflect the results of this added field survey. The bottom of the channel increases in elevation from the pooled area and then the channel bottom decreases in elevation down to the culvert. The surveyed spot elevation of 197.16 is the channel invert at the dividing crest. Downstream (southeast) of that crest, water quickly drains the channel, leaving only a few short lived puddles in the center of the channel. The length of the channel downgradient from the crest is 83 feet long. Upstream from the crest, the remaining standing water pools at the crest elevation of 197.16. This pooled area covers an area of 1,540 square feet, which is about 24% of the total wetland. This pooled area has some potential to be a vernal pool, but we were not called in on this job early enough in the year to make that determination.

The northern wetland has also been impacted by historical land use changes. The construction of Newtown Road may have blocked the former natural overland flow drainage, and thus the wetland conditions may be partially man-made. In addition, Newtown Road has a direct impact to the water chemistry of the pooled area. During the July site walk, an oil film was observed in parts of the pooled area. In addition, in the spring when snow melt coincides with amphibian breeding time, salt water splash-over from Newtown Road can be a potential adverse impact to overall habitat value. The salt splash-over distance is typically measured at 14 feet, and therefore salty water is certainly getting into this wetland given the narrow sidewalk and the narrow bank which drops down to the pooled area. I measured the conductivity of the water in the puddled area at 338 μmhos per centimeter (25°C). In pristine waters, conductivity is usually less than 100 and often less than 40. The elevated conductivity of the water is a direct impact of salt use on roads and other suburban impacts.

This "northern wetland" does appear to have the potential to offer vernal pool habitat as indicated by the signs of flooding to depths of about 1.5 feet and the presence of caddisfly larvae and amphibious snails. Though not directly observed, these signs suggest that amphibians such as wood frogs, American toads, spring peepers, or mole salamander may breed in the northern wetland.

Chapter F3.14 of the Bylaw requires a buffer zone to vernal pools of 100 feet or ½ the distance from the pool to the nearest foundation. Since the nearest foundation is 82 feet away from the isolated pool elevation, the vernal pool buffer zone is set at 41 feet. This vernal pool buffer is not given any specific significance in the Bylaw or accompanying Regulations, however CRL presumes that it is meant to initiate higher levels of review in order to protect wildlife habitat features associated with breeding vernal pool amphibians.

Within the northern wetland, patches of upland vegetation on hummocks were observed. The upland plants observed were white ash, black birch, hawthorn, white pine, American hazelnut, multiflora rose, sarsaparilla, and partridgeberry. Dominant wetland plants in the northern wetland were red maple, poison ivy, arrowwood, and jewelweed. See Table 1 for the list of plants observed in this northern wetland.

2.4 Remaining Wetlands

The southern wetland associated with Conant Brook is mostly a floodplain wetland and is not likely to contain significant breeding habitat for vernal pool amphibians. The intermittent steam cutting through the site however, could potentially be habitat for other types of amphibians such as the pickerel or leopard frogs. It is clear that the various wetlands on site support different habitat preferences and life cycle needs for a different set of wildlife species, with a modest likelihood of some overlap. The amphibian species that have specific habitat preferences to their wetland will unlikely have the need to cross the upland buffer zone to access a different wetland type.

2.5 Buffer Zone

The upland buffer zone portion of the site is the location of all proposed work. The uplands consist of a mixed deciduous and white pine forest with about 80% canopy cover and a notable amount of rock and boulder outcrops and fallen tress. These features provide moderate cover to migrating, overwintering, or burrowing wildlife. The dominant upland vegetative species are black birch, red maple, white pine, Norway maple, maple-leaved viburnum, northern arrowwood, poison ivy, American hazelnut, highbush blueberry, cinnamon fern, interrupted fern, and Canada mayflower. No bird nests were observed through out the site in the uplands or wetlands.

Some important features to evaluate when examining wildlife habitat are edge, foliage height diversity, moisture regime, winter food, and plant species diversity. The upland portion of this site lacked any notable edge except for the existing cart path. The tree canopy was well established. The shrub layer varied on site from sparse to thick. Where the shrub layer was sparse, a moderately dense herbaceous layer existed. Where the shrub layer was dense, the herb layer was poorly developed, partially due to a thick leaf mat. The foliage height diversity was average. The moisture regime was present only insofar as the vernal pool and intermittent stream areas hold seasonal water. Several hundred feet away from any proposed work a year round source of water exists in Conant Brook. The plant species found on-site have a modest winter food value. The only buffer zone plants which offer winter food are white pine, poison ivy and the few dogwoods. Finally, plant species diversity is above average, but that is mostly due to the weedy or invasive species on site. As will be seen later, the overall number and diversity of wildlife habitat features on-site will be increased from predevelopment conditions.

3.0 Proposed Work

It is proposed to construct a single family house with an associated driveway and septic system. There is no work whatsoever proposed in any wetland resource area. Thus no work will be occurring in any wetland, any potential vernal pool, nor any riverfront area. Additionally, no work is proposed within 25 feet of any wetland resource area and no structures are proposed within 45 feet of any wetland resource area.

The potential vernal pool area and surrounding 41 foot buffer zone account for about 11,175 square feet of the 3.7 acre lot. Of this 11,175 square feet, 99% of the area will be undisturbed and only hay bales will be in the 41 foot buffer zone. ***Therefore, only a minimal amount of impact is proposed to the potential vernal pool buffer zone.***

Table 1. Plants Observed in the Northern Wetland, Lot 1, Newtown Road, Acton, Mass.
An asterisk indicates plants stunted due to lack of moisture.
(U) indicates an upland plant.
(I) indicates non-native invasive species.

Tree Layer	black birch (U)
	white ash (U)
	slippery elm
	red maple
Shrub Layer	hawthorn (U)
	multiflora rose (I)
	American hazelnut (U)
	white ash (U)
	white pine (U)
	slippery elm
	highbush blueberry
	poison ivy
	arrowwood
Herb Layer	partridgeberry (U)
	sarsaparilla (U)
	skunk cabbage*
	sensitive fern*
	jewelweed*
	spinulose woodfern
	New York fern
	cinnamon fern
	sedge
	hydrophilic grass
	Jack-in-the-pulpit
	rough-stemmed goldenrod
	non-sphagnum moss
	meadow-sweet

It is important to note that a large developable upland area south of the intermittent stream will remain untouched. Under a limited project status, the applicant could have sought a barn, guest house, etc. Also, this upland is potentially accessible for development from adjacent parcels to the south. Instead, the applicant is willing to leave the remainder of the lot undeveloped.

4.0 Proposed Mitigation

In order to compensate for the impact of desired construction and permanent structures, several significant wildlife mitigations and enhancements are provided.

- No alteration is proposed to an wetland resource area.
- No structures are planned within 45 feet of a wetland resource area.
- A significant amount of additional upland/buffer zone beyond the 40 foot buffer, including the highest elevation on site (elev. 206), is to be left undisturbed.
- All surface water runoff from the roof and driveway will be recharged through stone trenches precluding any point source discharge to a resource area or buffer zone.
- All landscaping will be contained within the bound of the proposed stone wall. Landscaping plants will be limited to lawn and native vegetation. Thus approximately 125-foot by 90-foot area (about 7% of the lot) will be the only permanently altered part of the lot. The remainder of the lot will be natural and vegetated.
- All remaining areas temporarily altered for grading related to driveway and septic system construction will be restored to a wildlife area.
- No fertilizers/pesticides/herbicides will be used on the lot.
- The driveway between the stone wall and Newtown Road (about 140 linear feet) will not be paved, but instead will be crushed stone.
- The small area of driveway grading north of the driveway will be planted with shrubs and wildflower species desirable for wildlife. The shrub locations are specified on the site plan. Shrub species will be consist of American hazelnut (*Corylus americana*), flowering dogwood (*Cornus florida*), and/or lowbush blueberry (*Vaccinium angustifolium*). The slope will be seeded with a Northeast Upland Wildlife Seed Mix available from Southern Tier Consulting, Inc. at (800) 848-7614.

South of the proposed driveway is the leaching field. This area cannot be replanted with large tree species due to the necessity of maintaining the integrity of the septic system. The area will be maintained with shallow rooted vegetation and other features conducive to wildlife movement. A wildflower/wildlife meadow is proposed. The meadow will be planted with the above referenced Wildlife Seed Mix. The seeds in the mix will provide good cover for small mammals, amphibians, and reptiles. Additionally, birds will be able to nest in the meadow grasses.

Around the perimeter of the meadow, additional American hazelnut, dogwood sp., and/or lowbush blueberry plants will be established. Throughout the meadow, several small boulders and downed trees, ranging from 6 inches to 1.5 feet in diameter, will be placed on the ground to create cover and food. These downed trees will be obtained by relocating downed trees currently in the proposed house area.

At the edge of the meadow, an open sand turtle nesting area will be constructed. This feature will provide turtle nesting opportunities that did not previously exist. A layer of coarse sand at least 9 inches thick shall be placed over the fill material. The sandy area will be planted randomly with five clumps of native bunch grass (*Andropogon scoparius*) and will be partially surrounded by a highbush blackberry hedge. This blackberry hedge offers some protection from predators and is very high in food value.

The mitigation/enhancement measures will create a wide (140 feet) wildlife corridor that allows easy movement between the northern and southern on-site wetlands. Any small animal could easily travel from one wetland to the other if desired. If a small mammal, reptile, or amphibian were to encounter the stone wall during migration through the corridor, it could follow the edge of it, cross the gravel drive, and reach the other wetland.

The features of edge, foliage height diversity, moisture regime, winter food, and plant species diversity that were mentioned earlier can now be re-evaluated under this new plan. The created meadow will create significant edge that previously did not exist at its interface with the partially wooded uplands/wetlands to the north and south. The foliage height diversity will be increased with the addition of a variety of shrubs and herbs. The moisture regime will remain unaltered. Some winter food value will be lost with the removal of some white pine trees, however a larger variety of winter food plant species will be available. Specifically dogwood and blackberry will be planted, which offer highly nutritious berries. Finally, plant species diversity will be increased with the introduction of new, native species to the site and simultaneous maintenance of most existing species on the site. As can be seen, the overall number and diversity of wildlife habitat features on-site will be increased from predevelopment conditions.

5.0 Requirements of Acton Wetlands Protection Bylaw Section F8.1

Section F8.1 of the Acton Wetlands Protection Bylaw requires that the applicant bear the burden of proving that the work proposed in the application will not have "significant impacts" on the interests protected in the Bylaw. The interests of the are public or private water supply, groundwater, flood control, erosion control, storm damage prevention, water pollution prevention, fisheries, and wildlife habitat.

5.1 Public or private water supply. Does not apply to this project.

5.2 Groundwater. The only perceived impact to groundwater could be the addition of a septic system to the site. Title 5 Regulations require a 4 foot separation from the top of the groundwater table in order to protect groundwater. Additionally, Title 5 requires a 50-foot setback from wetlands. These Title 5 standards are not arbitrary but are the result of significant research undertaken to ensure the protection of groundwater quality. This site meets all Title 5 standards and has obtained Board of Health approval In addition, the Mass. Regulations to the Wetland Protection Act presume that if Title 5 is satisfied then the interests of the Wetlands Protection Act are also satisfied. Section F4.4 of the local bylaw seems to apply the same standard. In the setback sections of the Acton Bylaw, there is no note of a minimum setback requirement for a septic field. The setback most likely to apply is a 40 foot setback for structures, the septic field being a structure. Per the second reason for denial, the septic field for the FAST system is set more than 50 feet from all wetlands. Therefore, the presumption is that groundwater is sufficiently protected.

As far as protecting the northern wetland from septic system impacts, assurance can be had by noting the groundwater elevations. By drawing a line from the northern wetland through the septic field to the large wetland to the south, it can be seen that the groundwater elevation drops from above elevation 197 to below elevation 194. Thus the most likely groundwater flow direction is away from the northern wetland toward the southern wetland. Even if the flow was theoretically straight to the northern wetland, the flow would not arrive at a pooled area but at the stream channel. Thus, any potential impact of sewage would not impact pooled areas, but would be rapidly removed from the site by surface flows through the channel and subsequent culvert.

A second issue is the impact of recharging water from the new impervious surfaces on site. For this project, all roof runoff will be recharged in drip-line trenches, and there will a recharge trench along the entire driveway edge. This will help clean the water and actually increase the total volume of water getting to the northern wetland. As such, the added water arriving as groundwater flow over a sustained period of time will add to the duration of standing water on-site. Thus there will be a slight increase in the duration of flooding in the pooled area, and this will slightly improve vernal pool habitat value.

5.3 Flood control and Storm Damage Prevention. No work is proposed in the floodplain. Also, the off site peak flows will not be increased due to the above mentioned recharge of all impervious surface runoff. Therefore these interests are adequately protected.

5.4 Erosion control. Completed erosion control will be placed at the downgradient edge of work to prevent erosion into the wetland resource areas. Therefore, this interest is protected.

5.5 Water pollution prevention. No work is being performed in or immediately adjacent to a waterbody. The two nearest temporal water bodies are the pooled area in the northern wetland and the southern intermittent stream. There will be no direct discharge to any wetland area or waterbody. All on-site impervious runoff will be dissipated through recharge trenches and subsequently enter the wetland through base flow. Any direct surface flow to the wetland resource area will be from natural wooded areas. Therefore, the interest of water pollution prevention is sufficiently protected.

5.6 Fisheries. Does not apply to this project.

5.7 Wildlife habitat. Based on the previous two Conservation Commission denial decisions, it is apparent that wildlife habitat is of concern on this site. Section F8.3 of the Bylaw outlines the minimum setbacks from the edge of wetlands necessary for the protection of the Bylaw interests. These setbacks, specifically the 25-foot buffer of undisturbed vegetation and the 40-foot setback to the edge of driveways, roadways, and structures, have been met on this site. The most recent denial by the Commission has not issued a written decision extending these setbacks further. Therefore, without any mitigation work, the interest of wildlife habitat is sufficiently protected particularly in light of the 41-foot vernal pool buffer zone. Nevertheless, the applicant is proposing to go through great measure to add and enhance many wildlife features beyond the 40-foot buffer zone. As discussed above and presented in the site plans, an extensive 140 foot long wildlife corridor between the two wetland areas is proposed This will allow wildlife to use almost the entire site and take advantage of many added features. Under the current proposal there will be no "***significant***" impact to wildlife habitat within 100-feet of the wetlands.

There are no other performance standards of interests in the Bylaw of Regulations for work within 100-feet of wetlands.

6.0 Evaluation of Impacts.

The previous denial of the project speculated on several items. The main issue was that the septic field would pollute the northern wetland. However, this fear is unfounded when one looks at the groundwater elevations. If one draws a line from the northern wetland through the septic field to the large wetland to the south, it turns out that the groundwater elevation drops from above elevation 197 to below elevation 194. Thus the most likely groundwater flow direction is away from the northern wetland toward the southern wetland. Even if the flow is straight to the northern wetland, the flow would not arrive at a pooled area,

but at the known area of stream channel. Thus, the potential impact of sewage would not impact the pooled area, but would be rapidly removed from the site by surface flows in the well developed channel.

In addition, the Mass. Wetland Regulations presume that if Title V is satisfied that the interests of the Wetlands Protection Act are also satisfied. Section F4,4 of the local bylaw seems to apply the same standard. In the setback sections of the Acton Bylaw, there is no note of a minimum setback requirement for a septic field, and the setback most likely to apply, is a 40 foot setback for structures, the septic field being a structure. Per the second reason for denial, the septic field for FAST system is set more than 50 feet from all wetlands.

A second issue is the impact of recharging water from the new impervious surfaces on site. I spoke with the project engineer and roof runoff will be recharged in drip-line trenches, and there will a recharge trench along the entire driveway edge. This will help clean the water and actually increase the total volume of water getting to the northern wetland. As such, the added water arriving as groundwater flow over a sustained period of time will add to the duration of standing water on site. Thus there will be a slight increase in the duration of flooding in the pooled area, and this will slightly improve pool habitat value, vernal pool or not.

7.0 Conclusion

The site has a history of land use including excavation, a possible old foundation, observed ornamental plantings, and an old cart path. In addition, there is some invasion by non-native species and by plants that have become established along Newtown Road. The northern wetland has a stream channel for an outlet, and the channel outflow does reduce the duration and depths of sustained standing water which may or may not be used by breeding amphibians. The groundwater recharge of clean roof runoff will slightly enhance the duration of ponding, and thus will offer a slight improvement to pool hydrology. Finally, a significant 140 foot wide wildlife corridor is proposed to maintain wetland connectivity through uplands and to offset any perceived impact of the new house construction.

It is the opinion of CRL that the current project offers a very reasonable proposal for the development of a single family house lot. The proposal adds many new wildlife features to the site to account for wildlife needs such as migration, food availability, shelter, nesting, etc. This project has sufficiently protected and demonstrated no significant impact to the interests of the Bylaw.

On an economic note, if the town decides to purchase this land or create a taking, the wetland values on site will never return anywhere near the cost of the land in returned value to the community at large. In fact, the mosquito breeding on site may have a larger negative impact than any known wetland values presently existing near the proposed house and septic field. If there are any questions about this site and the habitat value, please don't hesitate to contact me.

Carr Research Laboratory, Inc.

by Jerome B. Carr

Jerome B. Carr, Ph.D.
Telmatologist (Wetland Scientist)
Certified Professional Hydrologist
Certified in Habitat Evaluation Procedures